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Coalition Building in Space:
Where Networks are Power

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Naval Postgraduate School

October 2011

This product is the result of collaboration between the Defense Threat Reduction Agency's Office of Strategic Research and Dialogues and Naval Postgraduate School

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[Prepared for the DTRA-funded project on "Allied Security and an Integrated Satellite Network"]

Coalition Building in Space: Where Networks are Power

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Abstract: *This study begins with the widely recognized problem of 21st century space vulnerabilities. To address this challenge, it proposes the new concept of an "allied space network" as a possible means of both reducing risks and enhancing space power. Such a concept would move beyond realist, Cold War "balancing" in space, and instead would require new forms of technical and political cooperation in the military sector among participating states. In thinking about future space security, however, this study argues that trans-national networks and alliances offer considerable untapped potential, with possibly significant benefits particularly for the United States, which—unlike China and Russia—already has established military alliances with a number of countries possessing or now developing advanced space capabilities.*

The challenge of achieving security in space has traditionally been viewed as purely a *national* security matter. Until 1991, space activity was dominated by the hostile U.S.-Soviet rivalry, which prevented active security cooperation in space beyond a series of restraint-based agreements. Other space actors remained too weak to matter. In terms of space operations, the two superpowers kept apart from one another except for occasional, publicity-serving civilian missions like the 1975 Apollo-Soyuz flight. What passed for cooperative "space security" arrangements during the Cold War emerged from a somewhat uncomfortable mutual tolerance of highly independent (and classified) U.S.

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[1] The views expressed in this paper are the author's alone and do not represent the official policies of the U.S. Navy or the U.S. government. An initial draft was presented at the annual meeting of the American Political Science Association, Washington, D.C., September 2-5, 2010. The author thanks Jonathan Havercroft, Wade Huntley, and an anonymous reviewer for their useful comments and suggestions.

and Soviet reconnaissance satellites and a series of largely bilateral (and a few multilateral) treaties that banned certain extremely harmful activities. Fortunately, thanks to these limited mechanisms and policies of self-restraint, the Cold War in space ended without any direct attacks on either side's satellites or other spacecraft.

Yet, since the end of the Cold War, there has been very little further progress made toward strengthening international space security mechanisms, while there has been a spread of space technology and an expansion in the number of actors capable of doing harm in space. China broke an informal 22-year moratorium against kinetic-kill anti-satellite tests in January 2007 by destroying its own *Fen-Yung 1C* weather satellite at 525 miles up, creating more than 3,000 pieces of hazardous debris. In response, India has vowed to develop an anti-satellite capability. In the face of the 2002 U.S. decision to withdraw from the Anti-Ballistic Missile (ABM) Treaty and the Navy's February 2008 destruction of an ailing satellite with a full tank of hydrazine (*U.S. 193*)—although at low altitude and with no long-lasting debris—Russia stated that it would respond to any future U.S. action to weaponize space with its own program. Among new actors, Iran successfully orbited a satellite in 2009, and North Korea has made two attempts to do so, raising concerns about these actors' intentions in space. Recent events have also stimulated interest in space among other national militaries, some of whom now speak of new "threats" to their space assets. In this context, action-reaction space arming is a widely feared trajectory. These dynamics pose a serious risk, particularly because there are a number of significant loopholes in the loose network of existing Cold War space security treaties and conventions, which currently allow a variety of space weapons to be tested and deployed in compliance with international law. Moreover, the space

environment lacks adequate verification mechanisms—such as pre-launch inspections, on-orbit spacecraft monitoring, and comprehensive space situational awareness—and is characterized by an increasing number of actors.

In the face of this worrisome trends, one influential school of thought among U.S. space analysts sees strengthened *national* military measures—including ground-to-space weapons, air-to-space systems, and space-based weapons—as the most desirable path for addressing this emerging space security dilemma. Such perspectives prevailed among the senior ranks of Defense and State Department officials during the George W. Bush administration and remain popular among conservative analysts. This perspective warns of the risk of what the 2001 Rumsfeld Commission report called a "space Pearl Harbor," unless the United States deploys a range of defensive and offensive space weapons,[2] even though many of these analysts recognize that such deployments might stimulate the same behavior among foreign space programs. But they see few alternatives.

A second school of thought argues that strengthened norms, rules, and international treaties are the best means of achieving space security and preventing a looming space arms race. This school is found mostly among non-governmental organizations, the arms control community, and some members of the Barack Obama administration, who have argued that the risks to space security are inherently international and that the main problem lies in the lack of clear "rules" for space. They point out that the use of space for weapons purposes will impinge on other actors as well, particularly if the attacking country creates orbital space debris that then becomes a risk

[2] U.S. House Armed Services Committee, "Report of the Commission to Assess United States National Security Space Management and Organization," January 11, 2001, available online from the Air University's National Space Studies Center website, at: http://space.au.af.mil/space_commission/ (accessed August 27, 2010).

to other space assets. For this reason, the Obama administration made significant changes in the U.S. National Space Policy released in June 2010,[3] which now—in contrast to the Bush administration's policy—*supports* U.S. consideration of new, verifiable international agreements to improve space security.

However, progress on the international front, now almost two years into the Obama administration, has been elusive. In fact, despite more accommodative policies undertaken since 2009 by both the United States and China at the U.N. Conference on Disarmament in Geneva, there have been no formal international talks on space security, thanks to Pakistan's opposition to forming an agenda that includes a Fissile Material Cut-Off Treaty. This has prolonged a gap in such discussions that has lasted since the early 1990s. In this context, treaty loopholes have festered since the end of the Cold War, while space technology has become more sophisticated and more dispersed during the same years. As a bipartisan U.S. study on security in the "global commons" issued in January 2010 concludes: "Space is in serious need of stronger international regimes."[4] Unfortunately, such agreements do not currently appear to be on the horizon, except for a voluntary European-sponsored Code of Conduct proposal. These trends foster uncertainty in regards to space and a tendency among national militaries to look to traditional, weapons-based solutions, whose testing, debris generation, and hair-trigger alert systems may put spacecraft at *greater* risk than even during the Cold War. For these reasons, alternative approaches to reducing space vulnerability are needed—and soon.

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[3] The White House, "National Space Policy of the United States of America," June 28, 2010, available on the White House Office Science and Technology Policy website, at: http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf (accessed August 27, 2010).

[4] Abraham M. Denmark and James Mulvenon, eds., "Contested Commons: The Future of American Power in a Multipolar World," Center for a New American Security, Washington, D.C., January 2010, p. 33.

Notably, one option that has not been examined seriously enough in the current space debate is a possible middle-ground alternative for reducing spacecraft vulnerability: that of creating an allied space "network." Specifically, linking space capabilities first among formal U.S. military allies and then perhaps with other friendly nations could greatly reduce (if not eliminate) the risks of single-point failures to important space systems and create a new form of space deterrence by raising the stakes for adversaries considering launching attacks on space assets. That is, by spreading capabilities among allies in space through the creation of inter-operable, redundant networks of satellites, including in the military sector, space-based partnerships could reduce costs, lessen vulnerability, and raise the challenges facing would-be attackers, thus obviating the need for expensive and destabilizing space-based weapons. This could provide considerable benefits in terms of U.S. and allied space security and improve chances for developing norms of peaceful international behavior.

Yet despite these possible advantages of "allied" space thinking, no conceptual framework had been developed to date, and policy support has only very recently emerged in the 2010 National Space Policy and the 2011 National Security Space Strategy. Operational cooperation is still very rudimentary, where it exists at all. Indeed, as the former head of U.S. space operations in Afghanistan complained regarding the *lack* of integration of allied orbital assets: "U.S. space operators are not trained in how to be integrated into a coalition environment."[5] The reason stems from more than five decades of viewing space almost exclusively from a *national* security perspective, rather than an international security or coalition framework. This article argues, however, that changing

[5] USAF Lt. Col. Tom Single, quoted in Peter B. de Selding, "U.S. Officer: Secrecy Among Coalition Forces Hinders Use of Space Assets in Afghanistan," *Space News*, May 10, 2010, p. A1.

conditions in space are making the traditional approach out-dated and increasingly ineffective. Instead, an allied approach to space may represent the best short-term route to enhanced U.S. and allied space security, while potentially offering benefits to the global community of space users as well through its promotion of restraint-based norms.

In order to address these issues, this article first analyzes the nature of space vulnerabilities and offers a reconceptualization of the current security dilemma facing nations in space. It next considers the specific emerging threats to 21st century space security and discusses a possible framework for moving from national to multilateral means of combating them. In doing so, it notes certain obstacles to be overcome as well. Finally, the article sketches out in draft form what specific capabilities might be desirable and what foreign contributions the United States might enlist in creating an allied space network to increase the mutual security of its members.

Reconceptualizing Space Security

The issue of spacecraft vulnerability relates to certain basic facts of orbital physics combined with the relative transparency of space to radar, optical, and infrared observation.[6] These conditions make spacecraft liable to tracking by even amateur astronomers with only moderately sophisticated equipment, which is easily obtainable by any entry-level space power. While more complex guidance technology is required for actual attacks on space assets and a global network of radars is needed for conducting post-attack assessments of damage done, the ability of even moderately advanced space powers to conduct significant counterspace activities is not in question. Thus far, only Russia, the United States, and China have tested kinetic capabilities, but a number of

[6] On these issues, see David Wright, Laura Grego, and Lisbeth Gronlund, *The Physics of Space Security: A Reference Manual* (Cambridge, MA: American Academy of Arts and Sciences, 2005).

other countries (including Iran) have carried out lesser forms of electronic interference. As a major space assessment conducted by NATO's Joint Air Power Competence Centre in 2009 reported on some of the current vulnerabilities faced by the alliance in space:

> There are real and credible threats to Space systems. The ground systems are vulnerable to attack. There has been demonstrated use of GPS and SATCOM jammers. Anti-satellite (ASAT) weapons have been demonstrated by the Soviet Union…and in January of 2007, China demonstrated its capability […]. The potential exists for ground-based laser weapons, electro-magnetic pulse, and co-orbital ASAT weapons. Additionally, there are risks of collision from Space debris and impacts from solar events. There have been many instances of satellite telecommunications interference and piracy.[7]

Space assets are also threatened by a field of orbital space debris that is steadily growing due to the increase in human space activity and the inability of space to "clean" itself quickly. Depending on the altitude of the orbit, it can take years, decades, or centuries for pieces of space debris to deorbit. In the meantime, these particles (even as small as 1 centimeter) represent 18,000 miles-per-hour speeding bullets, which can destroy solar cells and cause often fatal damage to any spacecraft that are unfortunate enough to cross their paths.[8] Today's space environment is also characterized by an expansion in the number of civil, commercial, and military space actors, making international agreements more difficult than in the past.

In the face of these risks and evidence of both expanding military space programs and weapons test programs in several countries, the response by many U.S. military leaders, elected officials, and even experts is still a traditional call for exclusively national action to "defend" U.S. assets in space. To take just one U.S. example, Senator Jon Kyl (Rep., Arizona) stated after the 2007 Chinese ASAT test that the United States

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[7] Ibid., p. 8.
[8] National Research Council, *Orbital Debris: A Technical Assessment* (Washington, DC: National Academy Press, 1995), p. 12.

must deploy a fleet of space-based weapons to defend itself in space.[9] He made no mention of the threat China posed to other allied nations or their possible contributions to the U.S. response.

Historical conditions of anarchy in the international system have contributed to a tendency among leaders to conceive mainly of *national* responses to international threats. States are already organized for national defense, countries are jealous of spending scarce resources in potentially risky ventures with foreigners (even allies), and there are relatively low levels of trust regarding the reliability of international organizations. But three factors have altered global dynamics in the last few decades, each of which has an important space component that supports the creation of an allied approach to space.

First, the scale of multinational interactions to deal with shared problems is increasing due to the growing "finiteness" of the globe, as the world's population continues to expand and as communications technologies become more intrusive and more widespread. Indeed, the very nature of the problems countries are facing is changing as the Earth becomes "smaller": almost all free land and airspace (up to 100 kilometers) have been claimed by nations (or otherwise allotted by international law), the sheer scale of industrial pollutants is beginning to have global effects, and such resources as clean air and water are becoming increasingly scarce. Other problems, such as climate change, are becoming recognized as requiring an international response. Despite its comparative vastness, near-Earth space faces some of the same risks of growing human activity, particularly due to the finiteness of its main, usable resources (geo-stationary

[9] "China's ASAT Test and American National Security," remarks by Senator Kyl at the Heritage Foundation, January 29, 2007, posted on the Globalsecurity.org website, http://www.globalsecurity.org/space/library/news/2007/space-070129-kyl01.htm (accessed February 1, 2010).

orbital slots, radio frequencies available for broadcasting, and safe access to low-Earth orbit). All of these resources are becoming stressed by increasing human space activity.

Second, and related, economic globalization is an increasing fact of life. Unlike during the Cold War, when the world was dominated by two, nearly self-sufficient blocs, changes in the international economic system (due to both political and technological factors) has made commercial exchange possible across almost all political boundaries, vastly increasing global trade. Interdependent economic relationships are the rule in U.S. ties with our NATO and Asian allies and even, in some areas, with commercial partners like Russia and China. Similar to many industries, the commercial space industry has become truly international and now generates $161-billion in sales,[10] making it a valuable resource for both national governments and the global economy more generally. Technologies built in one country are frequently owned and marketed by another and are sold to clients in yet another. Strong corporate alliances have already been formed in the space industry, for example, linking Russian rocket motors with U.S. launch vehicles (International Launch Services) and U.S. sub-orbital flight technology with British funding and marketing (Virgin Galactic). With some offshore corporations like Intelsat, it is often difficult to tell which individual country a space enterprise actually "belongs" to. National militaries are also purchasing bandwidth on a large number of commercial satellites, causing the breadth of a country's "critical assets" to expand. Some of these assets are already shared with other nations, although not in a joint operational sense. Yet devoted military space cooperation between countries remains highly restricted and out of step with these integrationist tends.

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[10] News Briefs, "Satellite Industry Revenues Topped $160B Globally in '09," *Space News*, June 14, 2010, p. 8.

Third, in military affairs, questions of international legitimacy are placing a growing emphasis on the need to conduct operations via coalitions. Put simply, the unilateral use of force is seen as increasingly unacceptable within the international community. Largely for this reason, the United States fought under a U.N. mandate in 1991 in the Gulf War against Iraq's intervention into Kuwait and in Libya in 2011; it fought under a NATO mandate in the Balkans and now in Afghanistan; and it fought (less "legitimately" from the perspective of the rest of the world) with an ad hoc coalition of friends and allies in 2003 in Iraq. Indeed, there is a growing literature on the need for some international approval even for humanitarian interventions by military forces in the modern era.[11] Ironically, given these pressures to cooperate in military activity, space remains an outlier. Unfortunately, the U.S. military has found by experience in Afghanistan that national barriers have impeded its effective use of space-derived data. As a one recent analysis of the problem of information-sharing in Afghanistan observes: "secrecy often keeps coalition team members from speaking about space-related topics with each other."[12]

But these points raise a critical "process" question: How do countries come to realize that their security needs in an area of activity have crossed the line from national to international? Realist political theory argues that security, by its very nature, is something that falls to states, as the essential building blocks of the international system and the repositories of sovereignty within it. Yet space is an area specifically delineated as beyond national sovereignty by international law in the 1967 Outer Space Treaty. The

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[11] See, for example, Martha Finnemore, "Constructing Norms of Humanitarian Intervention," in Peter J. Katzenstein, ed., *The Culture of National Security and Identity in World Politics* (New York: Columbia University Press, 1996).

[12] De Selding, "U.S. Officer: Secrecy Among Coalition Forces Hinders Use of Space Assets in Afghanistan."

failure of states to expand collective governance mechanisms more in regard to space may be a factor of habit, perspective, and inertia, plus normal bureaucratic opposition to negotiations aimed at creating new, specialized institutions beyond national control.

Recent threats to U.S. space assets have been viewed as *national* security threats because there is a long U.S. tradition of self-reliance in international relations and a perspective that successful collective action is rarely achieved. But, in space, all countries have an interest in protecting the environment from military threats and, in fact, from *any* obstacles to either free access or free passage. These conditions create fundamental incentives for collective action that do not exist in other areas of international relations. Ironically, one of the primary obstacles to enhanced collective action to protect space security may be the thinking of the actors themselves, which still remains largely rooted in the unilateral traditions of security provision from past security frameworks. But, as Robert Keohane argues, "To pursue self-interest does not require maximizing freedom of action. On the contrary, intelligent and farsighted leaders understand that attainment of their objectives may depend on their commitment to institutions that make cooperation possible."[13] Working with allies, therefore, may represent the best security solution available at this point in space history, and perhaps may serve as a bridge to broader forms of international cooperation in the future. Alliance-based efforts could mitigate a variety of emerging space-related security concerns. The prior existence of allied military institutions—particularly established patterns of cost-sharing, integration, joint operations, and joint training—both in the case of NATO and in various bilateral

[13] Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton, NJ: Princeton University Press, 1984), p. 259.

arrangements with Asian countries (such as Australia, Japan, and South Korea) should reduce typical collective action problems in forming such new mechanisms for space.

Roots of a Multinational Approach to Space Security

Notably, there is a long history of attempted transnational approaches to space security. Space activity actually began in the context of a major multilateral scientific initiative known as the International Geo-Physical Year (IGY). Both the Soviet Union and the United States announced plans to orbit satellites as part of their contributions to the IGY—and the Soviets got there first. However, any hope of using international science cooperation to promote international security in space soon fell to the wayside, given the context of the hostile competition between the Soviet Union and the United States.

Yet multilateralism in space did not die entirely. Two critical UN resolutions passed in 1963 and the ratification of the Partial Test Ban Treaty helped safeguard safe access to space through collective means in the face of threats of territorial claims, damage caused by ongoing nuclear tests in orbit, and disputes over future liability questions. As mentioned above, the further codification of space rules in the 1967 Outer Space Treaty helped expand the notion of space as an extra-territorial realm with a range of collective restrictions on military activities, particularly on the Moon and the celestial bodies. The bilateral ABM Treaty and the Strategic Arms Limitations Talks Interim Agreement (SALT I) in 1972 prohibited space-based missile defenses and interference with national technical means of verification (i.e., satellites). The 1972 Convention on International Liability for Damage Caused by Space Objects further expanded the norm of mutual restraint in space and provided evidence of the willingness of even the world's

most powerful militaries to cede areas of space sovereignty to collective agreements in order to help ensure safe and reliable access. As Larry Wortzel observes, "The U.S. and the Soviet Union seemed to realize that it is potentially destabilizing to define the upper limits of sovereignty. Thus, neither country interfered with the other's free passage in space. Also, they agreed that the ability to conduct strategic verification from space stabilized the nuclear balance."[14] At the same time, joint military activities were not possible in the poisoned political environment of the Cold War. Still, important norms of space restraint did emerge between the two superpowers despite their political tensions.

In the early 1990s, the two formerly most hostile enemies took unprecedented steps after the Soviet break-up in civilian space cooperation, joining with Canada, Japan, and the countries of the European Space Agency in the construction of the *International Space Station* (*ISS*). This $100 billion civilian project is still ongoing and has linked the human spaceflight programs of all major space-faring countries, except China and India. Despite occasional glitches, it has worked remarkably well and has served U.S. interests. The U.S. commercial sector has become similarly international, including significant cooperation with Russia in the space launch field. But little such effort has been made to promote allied or other transnational space security engagement, particularly in operational programs.

Since the Soviet break-up and the rise of U.S. skepticism of the need for further space arms control, bilateral space security norms from the Cold War have failed to spread adequately among new space-faring nations, such as China. As Wortzel points out, in contrast to the history of bilateral U.S.-Soviet relations in regard to space: "No

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[14] Colonel (U.S. Army, ret.) Larry M. Wortzel, "The Chinese People's Liberation Army and Space Warfare," *Astropolitics*, Vol. 6, No. 2 (May-August 2008), p. 128.

such dialogue has taken place with China."[15] Wortzel blames opponents from the People's Liberation Army for blocking initial U.S. overtures late in the Bush administration. Others blame the United States for rejecting talks on space security from 1998 to 2009 at the U.N. Conference on Disarmament in Geneva. Put simply, the United States did not perceive a demand for it until China's ASAT test in 2007. This neglect now seems short-sighted. What is more surprising is that, until very recently, there has been little engagement with U.S. allies in space security matters as well. Indeed, with the exception of some limited studies in the NATO context, no overarching framework for allied space cooperation to enhance space security has emerged in the post-Cold War period.

As noted in the introduction, the existing framework for space security remains problematic and there are few new initiatives to address these gaps. The one exception to the current stalemate occurred in December 2007, when the countries of the United Nations agreed to adopt a voluntary set of U.S.-supported debris mitigation guidelines, providing a limited set of norms. But the effort still fell far short of halting non-WMD weapons testing or deployment in space, even kinetic-kill tests, allowing such activities as long as the debris was short lived. It also created no international system for space situational awareness or enforcement, relying only on national means. As for treaties, the only proposal on the international agenda is the Russo-Chinese Prevention of the Placement of Weapons in Outer Space Treaty (PPWT)—a limited effort focused only on banning space-based weapons. However, the proposal exempts testing and development of other space weapons, such systems as China's ground-based ASAT, rendering its contribution moot. The more limited, European-sponsored Code of Conduct has been

[15] Wortzel, "The Chinese People's Liberation Army and Space Warfare," p. 128.

informally available for comment since December 2008, but—even if agreed to—will offer only partial effectiveness toward increasing space security given its voluntary status and its lack of specific monitoring and enforcement mechanisms.[16] As of late March 2011, the United States had only announced its support for the "process" of the code's elaboration, not for the document itself. Russian and China have flatly opposed the effort. Under these conditions, it is not yet possible to make the jump to a fully inclusive international space security arrangement or treaty. In the meantime, the United States and its allies might be well served to start building their own cooperative security network as a critical first step. Such a move would enhance U.S. and allied space security and perhaps serve as a model that can be expanded upon later, if other actors see benefits in joining the system (and the allies agree to such engagement).

To date, the concept of multinational space cooperation has been perhaps best exemplified in the European Space Agency's (ESA's) civil space programs, which are collectively organized, funded, and implemented. The *ISS* case is another example of successful civilian cooperation, bringing together the United States with ESA countries and Russia. Of course, other countries have cooperated in joint scientific and commercial projects as well, but almost none in the security realm. Even in Europe, space security cooperation—particularly in operational terms—has been very limited. Similarly, a review of the recent U.S. literature on space security reveals how little attention has been paid to concepts of possible military alliance-building for space. With a few exceptions, the topic has been largely ignored, due to the enduring propensity of most authors to view

[16] European Union, Draft Code of Conduct for Outer Space Activities, December 17, 2008, available on the Stimson Center website at: http://www.stimson.org/space/pdf/EU_Code_of_Conduct.pdf (accessed August 27, 2010).

space security from a purely nationalistic lens. This is even true within the academic community. A few examples are worth examining to highlight this point.

Everett C. Dolman's well-known book *Astropolitik: Classical Geopolitics in the Space Age* (Cass, 2002) argues that a single, major power (presumably, either the United States or China) will eventually exercise "space dominance" over other actors. Because of this assumption, he fails to consider seriously the possible role of alliance contributions to such strategies, arguing that all other powers will simply be forced to comply with the rules established by the hegemon, rather than themselves establishing a multilateral structure. The concept that an alliance of countries might dominate collectively is not considered, although Dolman admits about his offensive-oriented, state-centric approach to achieving space security: "in the long term, such a sustained policy is counterproductive and detrimental."[17]

Similarly, Benjamin S. Lambeth's otherwise very thorough coverage of space challenges *Mastering the Ultimate High Ground: Next Steps in the Military Uses of Space* (RAND, 2003) fails to refer to the possible contribution of allies at all, assuming perhaps that U.S. allies have no space assets worth considering. U.S. Navy Commander John J. Klein's book *Space Warfare: Strategy, Principles and Policy* (Routledge, 2006) mentions allies on a handful of occasions but only in a very theoretical context, such as the need to rally support from allies in case of facing a superior space power. Yet there is no discussion of what such countries might contribute in an operational sense in a conflict, much less consideration of the peacetime creation of a space-based alliance as part of a strategy of orbital deterrence. Notably, a review of the 2006 National Space

[17] Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002), p. 2.

Policy under the Bush administration, also reveals that U.S. allies are not mentioned in the section on "National Security Space Guidelines," except in a vague manner as possible recipients of U.S. space-derived intelligence data under certain, limited circumstances.[18]

Among authors more supportive of international space cooperation, Joan Johnson-Freese's book *Space as a Strategic Asset* (Columbia University Press, 2007) discusses the failure of NATO to come up with a unified space policy, in part due to the fact that "to date, most European military space programs have been strictly national programs."[19] She contrasts this failure with their highly integrated cooperation in the civil space field. Nevertheless, she remains skeptical of the ability of U.S. NATO allies to make significant contributions to U.S. space security, except in a supporting role. In other areas of space activity, however, Johnson-Freese cautions of the prospect that unduly restrictive U.S. export controls could stimulate civil and commercial space partnerships among China, Russia, and the countries of the European Space Agency (including many leading NATO members).

USAF Lt. Col. (ret.) Forrest E. Morgan's highly informative report *Deterrence and First-Strike Stability in Space: A Preliminary Assessment* (RAND, 2010) makes the case that the United States cannot expect to address its space vulnerabilities simply through threats of national retaliation, which are unlikely to be effective or convincing in space. Instead, Morgan argues for a mixed strategy of "threatening a range of punitive responses in multiple domains while at the same time reducing the benefits of enemy

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[18] The White House, "U.S. National Space Policy," August 31, 2006, posted on the website of the Federation of American Scientists, at: http://www.fas.org/irp/offdocs/nspd/space.pdf (accessed August 27, 2010).

[19] Joan Johnson-Freese, *Space as a Strategic Asset* (New York: Columbia University Press, 2007), p. 187.

attacks by improving defenses, dispersing and concealing space capabilities, and demonstrating the ability to rapidly replenish whatever losses are sustained."[20] Somewhat surprisingly, however, Morgan's prescriptions fail to mention the potential role of allies in carrying out such a strategy, perhaps because of the difficulties of overcoming traditional secrecy concerns.

Within the literature, therefore, there are relatively few supporters of new allied space structures. One of the few exceptions is Steven Lambakis's book *On the Edge of Earth: The Future of American Space Power* (University of Kentucky, 2001). Although Lambakis portrays space largely within a realist-driven framework of military struggle, he does consider the possible contribution of allies, noting "The United States will need the political support of its allies and friends as well as their involvement in military space activities, to include economic contribution through collaboration in system development and participation in operations."[21] He concludes by arguing in regard at least to ground stations and surveillance, there are "undoubtedly several contributions U.S. allies can make in these areas."[22] A more recent study by USAF Lt. Col. Michael P. Gleason goes further in spelling out why the specific political-economic situation of the second decade of the twenty-first century is ripe for such efforts, arguing: "With US budgets constrained and US security space programs lagging, now is the time to partner with the EU [European Union] in security space."[23] USAF Lt. Col. (ret.) Peter Hays makes the

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[20] Forrest E. Morgan, *Deterrence and First-Strike Stability in Space: A Preliminary Assessment* (Santa Monica, CA: RAND, 2010), p. 6.
[21] Steven Lambakis, *On the Edge of Earth: The Future of American Space Power* (Lexington, KY: The University Press of Kentucky, 2001), p. 285.
[22] Ibid.
[23] Lt. Col. (USAF) Michael P. Gleason, "Shaping the Future with a New Space Power: Now is the Time," *High Frontier*, Vol. 6, No. 2 (February 2010), p. 43.

supporting argument that "State-of-the-art constellations…can be augmented with state-of-the-world capabilities to make these capabilities more resilient."[24]

With some exceptions, this review of some of the leading recent studies of space security shows that there has been inadequate attention paid to the prospects of truly *allied* strategies to accomplish shared goals of space threat reduction, deterrence, and defense. Part of the reason, perhaps, is the general lack of familiarity among U.S. space experts with the emerging capabilities of allied space actors. Given the highly classified world of space operations, many military and governmental analysts simply tend to focus on keeping track of U.S. capabilities and problems. Similarly, existing U.S. export control restrictions make some forms of cooperation simply impossible, depending on the level of technology exchange involved. Congress too has been leery of funding any form of cooperation that might seem like "foreign aid" in space, and has only grudgingly gone along with civil spaceflight purchases from Russia, despite the coming break in U.S. capabilities to deliver astronauts to the *ISS*.

But the United States has global military responsibilities. It also works closely with allies on the ground, at sea, and in the air, such as in Afghanistan, Iraq, and Libya. Yet as the 2009 NATO assessment laments about the state of members' space assets: "[our] essential capabilities are at risk because we simply have not thought through the Alliance's Space needs, developed any strategy, considered the consequences of no action, or prepared any risk mitigation strategies."[25] As a result, the study complains:

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[24] Peter L. Hays, "An Agile and Adaptive Enterprise: Enhancing National Security Space by Improving Management Structures and Leveraging Commercial and International Partners," *Astropolitics*, Vol. 8, Nos. 2-3 (May-December 2010), p. 163.

[25] Joint Air Power Competence Centre, "NATO Space Operations Assessment," Kalkar, Germany, January 2009, p. 7.

"The current approach to Space is piecemeal, a bottom-up effort lacking overarching structure or direction."[26]

The 2011 National Security Space Strategy marked a major turning point in official U.S. thinking about allied space activity when it recognized that in an "increasingly congested, contested, and competitive" environment, the United States faced new "opportunities for leadership and partnership."[27] Although the NSSS provided few specifics, it pledged that: "With our allies, we will explore the development of combined space doctrine with principles, goals, and objectives that, in particular, endorse and enable the collaborative sharing of space capabilities in crisis and conflict."[28] Implementation, however, remains in its initial stages only.

With these challenges and opportunities in mind, it is now worth considering what specific advantages might accrue to U.S. space security from considering the possible contributions of allies, as well as how such a new military space partnership might actually be formed.

Getting from Here to There: Building a Layered Framework for Policing Space

Despite the risks facing U.S. space assets, the challenges for an adversary seeking to carry out a sustained campaign against space assets in multiple orbits in a non-cooperative context are still difficult, thus making redundancy and reconstitution strategies potentially very effective against limited attacks. To the extent that a group of allied spacefaring countries could create a network of interactive satellites and develop policies for mutual support in a time of crisis, such efforts could greatly reduce even the

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[26] Ibid., p. 1
[27] U.S. Department of Defense and the Office of the Director of National Intelligence, "National Security Space Strategy (Unclassified Summary)," January 2011, p. i.
[28] Ibid., p. 9.

risk of individual attacks on satellites, since any gaps could be quickly filled in and therefore rendered pointless. However, the United States and its allies are a long way from establishing this capability. This raises two related questions: what countries should be involved and what capabilities should be linked?

While the U.S. military has failed to date to form true space partnerships with other countries, there has been a rapid expansion in the space capabilities of allied militaries in the past 15 years. France has led the way in launch capabilities and Earth imaging (including for military purposes), but an additional five NATO countries—Canada, Italy, Germany, Luxembourg, and the United Kingdom—operate more than 10 satellites apiece for remote-sensing, communications, and scientific purposes. Meanwhile, Spain, the Czech Republic, the Netherlands, and Turkey each operate more than five satellites and associated ground stations.[29] Although the vast majority are civilian satellites, their militaries are becoming steadily more involved in space. Among U.S. allies in Asia, Japan is a major spacefaring country with extensive human spaceflight and space science experience, as well as valuable technology in its *H-II Transfer Vehicle* (used for the *International Space Station*), launchers, and communications satellites. In fact, a recent statement issued on the 50th anniversary of the U.S.-Japan alliance by U.S. Undersecretary of Defense for Policy Michele Flournoy specifically called out "the need to strengthen our cooperation under the alliance to promote the security of the global commons, including space and cyberspace."[30] In addition, South Korea has increasing experience in reconnaissance, communications, and

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[29] Joint Air Power Competence Centre, "NATO Space Operations Assessment," Figure 5: Nations Operating Satellites, p. 8.
[30] Michele Flournoy, "Point of View: U.S.-Japan alliance a cornerstone in a complex world," *Asahi Shimbun*, July 16, 2010.

satellite manufacturing, while moving steadily toward space-launch capability. Australia, Taiwan, and Thailand also have significant satellite operations experience. Finally, India is a highly capable space power as well, with launch systems to both low-Earth and geostationary orbits, reconnaissance assets, extensive space applications experience, and an expanding pool of skilled personnel. This situation represents a major, untapped U.S. resource for dealing with its space vulnerabilities. Indeed, it is fair to say that the United States has an "asymmetric advantage" over countries like China and Russia in having a host of significant spacefaring countries that are also military allies or friends. Yet almost nothing has been done to use this advantage to shape the emerging space environment to benefit the United States and its partners, or to set an example for other countries worldwide in responsible space behavior. Instead, as the 2009 NATO space assessment describes, current regulations make space information and operations "'too sensitive' to discuss outside of National boundaries."[31]

But a study of NATO's emerging space needs by USAF Major Thomas Single argues: "The emphasis must be on moving from a 'need to know' to a 'need to share'."[32] Time also may be of the essence. As Lt. Col. Gleason points out, the European Union—given its growing range of space assets—is "perfectly willing to develop its dual-use security space capabilities, architectures, and institutional structures without US involvement."[33] The same might be said of Japanese and South Korean capabilities in a few more years, without U.S. input. Thus, a priority should be to placed on building partnerships from the ground up as these systems evolve in order to, in Gleason's terms,

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[31] Joint Air Power Competence Centre, "NATO Space Operations Assessment," Kalkar, Germany, January 2009, p. 7.
[32] Thomas Single, "Considerations for a NATO Space Policy," *European Space Policy Institute Perspectives*, No. 12, September 2008, p. 4.
[33] Gleason, "Shaping the Future," p. 44.

influence the development of capabilities "in ways which will benefit American national security for decades into the future."[34]

While U.S. national security space programs need to be protected in this process, it is also worth observing that the United States has already shared sensitive data successfully with a range of countries in the nuclear sector, including with the United Kingdom and France. Moreover, officials and military officers from Germany and Australia have long cooperated with the United States on sensitive matters related to national defense including, in Australia's case, operating extremely sensitive facilities related to space-derived intelligence and early-warning information. Thus, the view of space operations as "too sensitive" to share may be an out-dated perspective, particularly as risks to assets rise and demands for cooperation increase. Under these conditions, a range of possible means of reducing threats to U.S. and allied systems might emerge through cooperation, with additional benefits in providing the framework for deterring harmful acts and perhaps building bridges with other responsible spacefaring nations. Such efforts would require amendment of existing and highly protective U.S. International Traffic in Arms Regulations (ITAR). But many officials and military leaders have been calling for exactly such reforms for years. Assuming that these controls could be modified to allow greater cooperation, what areas might be most fruitful for such allied networking?

First, the United States and its allies need to know where spacecraft are in orbit and where threats from orbital debris (whether intentional or not) might arise. This requires keeping track of both active and inactive spacecraft still in orbit. Today, the U.S. military operates the Space Surveillance Network, which has the world's most extensive

[34] Ibid., p. 43.

catalogue of space objects. Since the 2009 Iridium-Cosmos collision, the U.S. Air Force has begun to do more complete conjunction analysis and to share this information with other space users. At the same time, U.S. allies could supplement this effort by providing information from their radar systems. In particular, U.S. NATO allies operate a number of radars and telescopes at multiple sites in Europe that could be used to bolster joint capabilities.[35] Japan is also beginning research on space-based surveillance via satellite that could in the future yield additional useful data, particularly on microsatellites and their activities. Improved space situational awareness (SSA) through allied cooperation may be critical to determining interference with spacecraft and determining fault, as well as building international coalitions to establish the "ground truth" necessary for levying fines on space users, depriving perpetrators of access to space business, stripping them of rights to geo-stationary slots, or cutting-off frequency allocations for broadcasting satellites. Accordingly, the 2010 U.S. National Space Policy calls upon the U.S. government to "Enhance capabilities and techniques, in cooperation with civil, commercial, and foreign partners to identify, locate, and attribute sources of radio frequency interference, and take necessary measures to sustain the radiofrequency environment in which critical U.S. space systems operate."[36] Similar techniques need to be developed against laser, microwave, and other hostile technologies.

A second priority area after SSA is ensuring the continuation of service for global positioning, navigation, and timing networks like the U.S. Global Positioning System (GPS). The development of this satellite constellation has provided tremendous benefits

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[35] Xavier Pasco, "Toward a Future European Space Surveillance System: Developing a Collaborative Model for the World," in Logsdon, Moltz, and Hinds, eds., *Collective Security in Space European Perspectives*.

[36] The White House, "National Space Policy of the United States of America," June 28, 2010, p. 9.

to the U.S. military in being able to improve accuracy and reduce collateral damage and deaths with its weaponry, as well as assisting in a range of other military functions. Europe's planned Galileo system, Japan's Quasi-Zenith system, and India's future GAGAN system could provide important supplemental data should the GPS system ever be threatened by hostile actions in space. By ensuring compatibility among these networks and arranging for quick replacement responsibility within the constellation in case of attack, the United States and its friends and allies could guarantee that GPS information would be available in any future crisis.

A third critical area is reconnaissance. Currently, the United States relies on a relatively small number of large, highly expensive satellites in low-Earth orbit to provide high-resolution images on critical adversaries or problem areas. Due to the risk of their loss, the rising costs of such spacecraft, and the need for more data, the U.S. military has already begun contracting with such commercial firms as DigitalGlobe and GeoEye to provide imagery that, while not as precise, is good enough in many instances. Working with allies would provide yet another source of imagery in case of the loss of any U.S. military or commercial satellite in a crisis. These systems might include Japan's Information Gathering Satellites, Germany SAR-Lupe system, France's Helios (and future Pleiades), and Italy's Cosmo-Skymed.[37] South Korea also operates imagery satellites, as does the United Kingdom. Unfortunately, even in conflict zones such as Afghanistan, there has been little cooperation to date due to the lack of established mechanisms and strong countervailing traditions of space secrecy.[38] Such problems could be overcome through establishing protocols for exchanges of information as well as

[37] Adam Keith, "Diversifying Capabilities for Image Intelligence," *Space News*, July 19, 2010, p. 15.
[38] De Selding, "U.S. Officer: Secrecy Among Coalition Forces Hinders Use of Space Assets in Afghanistan."

possible designation of certain satellites as "allied," whether under NATO auspices or a larger space cooperation entity that would include non-NATO U.S. allies as well. These capabilities would ideally evolve over time toward development of a common software interface, if not certain shared hardware to promote interoperability and replacements. Joint training of officers could support such a system, thus developing core expertise across the alliance that would serve to expand effective use of space imagery on the battlefield and in peacetime. Surprisingly, excluding U.S. military space personnel (which numbered approximately 100), only one non-U.S. space professional was serving in the Middle East Area of Operation as of 2009.[39] Clearly, this is far from adequate.

As a fourth priority, communications and early-warning satellites located in geostationary orbit should be secured. Fortunately, this job is the easiest given the difficult of carrying out an undetected attack on an object at an altitude of 22,300 miles. Still, the United States and its allies should first develop mechanisms for replacing critical functions in case of problems. They should also begin outreach with other parties—including China, which is not covered by U.S.-Russian non-interference pledges—to respect the inviolability of early-warning satellites, in particular, given their role in promoting nuclear stability. Clearly, China should understand that any attack on an early-warning satellite could be legitimately mistaken as part of the first stage in a major nuclear attack and would trigger extreme means of defense by the United States and its allies.

A fifth area for allied cooperation is that of developing avoidance mechanisms—in other words, decoys and quick replacement capabilities to protect satellites. This is

[39] Joint Air Power Competence Centre, "NATO Space Operations Assessment," Table 3: Current Space Operations Personnel, p. 29.

better done in concert with multiple parties than unilaterally due to the advantages of having multiple platforms available *and* multiple launch sites. This could include developing standard, interoperable reconnaissance satellites and other critical spacecraft and locating them in different allied launch sites around the world. In a future world of cubesats, this kind of integration may become easier (and more affordable) than it is currently. Allies could also fly decoy satellites in their constellations to increase the burden of numbers on potential attackers, or collectively develop and deploy spoofing systems or chaff-releasing pods to foil enemy radar seekers.

Sixth, in case a satellite or spacecraft engaged in harmful activity would need to be stopped by the collective forces of a cooperating group of major space-faring powers, having the *collective* ability to deter, disable, and, if necessary, to destroy hostile space assets may be necessary in extreme circumstances. These could include existing ballistic missile defense assets (such as the U.S., Japanese, and South Korean Aegis systems and Ground-Based Interceptors in the United States, future MEADS-type interceptors in NATO, and perhaps other assets). Their use against a rogue actor would have to be coordinated by a joint space council of the allied powers. Such moves have critics and would need to be considered carefully for their possible effects on space security more generally. That is, while there is a temptation to take the next step to allied deployment of orbital space weapons in order to supplement new redundancy capabilities and currently limited ground- or sea-based counterspace weapons, further steps may be unwise, at least absent new threats. Lt. Col. (ret.) Morgan argues in response to calls in some quarters supporting deployment of space weapons and policies of attempted space dominance: "While such arguments resonate with those acculturated in the U.S. military tradition, it

is hard to conceive how placing counterspace weapons in orbit would do anything to defend U.S. satellites from enemy ground-based weapons or, for that matter, other weapons in space."[40] Morgan observes that such weapons themselves would be in fixed orbits and vulnerable to attack. He adds: "Taking this step may also encourage other spacefaring nations to follow suit, ultimately resulting in a dangerously unstable strategic environment that would generate severe 'use-or-lose' pressures."[41]

Finally, any allied approach to space security would likely have to create a functioning transnational, operational body to manage share systems, provide joint training, and handle finances. The 2009 NATO assessment concludes by calling for a Space Office at NATO headquarters as well as a NATO Space Operations Coordination Centre.[42] But, given the desirability of involving allies from Asia, a broader center seems to be more prudent. Access to the operations center would have to be strictly controlled through both a classification system and personnel reliability program. As noted, such efforts have succeeded in the past at sensitive NATO nuclear locations and at space sites in Australia. The program would have to start small and perhaps with a limited numbers of countries most heavily involved in space already: Australia, France, Germany, Italy, Luxembourg, the United Kingdom, Japan, and South Korea.

From this author's informal discussions, support for such a cooperative space network seems to exist already among a number of NATO members and in Australia, Japan, and South Korea. The U.S.-Australian announcement of planned SSA cooperation in the fall of 2010 and joint funding of the Wideband Global Satcom system mark important first steps toward operational integration. Notably, these trends are consistent

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[40] Morgan, *Deterrence and First-Strike Stability in Space*, pp. 33-4.
[41] Ibid., p. 34.
[42] Ibid., p. 46.

with the 2010 U.S. National Space Policy's call for new types of cooperation at the international level, including in the area of national security space. Indeed, the section on "National Security Space Guidelines" goes even further in spelling out: "Options for mission assurance may include rapid restoration of space assets and leveraging allied, foreign, and/or commercial space and nonspace capabilities to perform the mission."[43] These guidelines point to additional useful paths forward.

A supporting mechanism to begin building the model outward to friends and other responsible spacefaring nations—such as India, Israel, and others—might be the patterned on the Proliferation Security Initiative (PSI). This concept emerged in 2003 as a means of filling gaps in the NPT for stopping the illicit transit of weapons of mass destruction and related technologies, materials, and delivery systems. This Bush-administration-inspired "coalition of the willing" began to organize voluntary national military and law enforcement efforts into a process that would allow inspection and seizure of crews and contraband. Such a model may be useful for space as well. Another supporting concept for collective space security might be the U.S. Navy's idea of creating a large coalition of international assets to engage in collective maritime security: the 1,000-ship navy.[44] As Admiral Mike Mullen describes the maritime model, this would be a "global maritime partnership that united maritime forces, port operators, commercial shippers, and international, governmental and nongovernmental agencies to address mutual concerns."[45] Mullen views it as a voluntary network of maritime powers "interested in using the power of the see to united, rather than to divide."[46] For space,

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[43] Ibid., p. 13.
[44] Adm. Mike Mullen, "Commentary: We Can't Do It Alone," *Honolulu Advertiser*, October 29, 2006.
[45] Ibid.
[46] Ibid.

this could include commercial and scientific spacecraft as well and would thus involve many more players—functioning like an active "neighborhood watch" committee. The practical experience of international efforts to combat piracy off of the Horn of Africa may provide a positive lesson in regard to the future "policing" of space.

Despite the advantages of creating such an allied network for space, it must be admitted that a number of current obstacles exist to such efforts. Traditional U.S. thinking about U.S. exceptionalism in space would have to be revised and a more egalitarian view of alliance partners adopted. The U.S. State and Defense Departments would need to engage in ITAR reform and craft new military-to-military agreements (of the type the U.S. has with Australia) to allow the sharing of space information. In Congress, a new political willingness to fund space systems that would not be solely for national benefit or under purely national control would need to emerge. At the technical level, new integration with allied industry would likely be necessary to create common standards and interfaces, which would initially cost time and money. Still, given the emerging risks in space of and the possible benefits to be achieved by joint efforts, these problems do not seem insurmountable.

Conclusion

The challenges of space security today are typically viewed today as a state-centric rivalry for space supremacy: a highly nationalistic framework best suited to unilateral actions.[47] The context of traditional balance-of-power politics, therefore, has colored the lenses of most observers, leading to predictions of a state-versus-state showdown in space, similar to great battles of naval armadas in centuries past. However, under changing conditions, such a stove-piped view of space cooperation and operational

[47] On this approach, see Gordon G. Chang, "The Space Arms Race Begins," *Forbes*, November 5, 2009.

practices may make less and less sense, as well as increase risks to U.S. and allied space assets. Moreover, given the tightening financial situation in most allied countries today and in the United States itself, pooling resources may be the most effective means of building new capabilities. As the 2009 NATO spaced report concludes: "Increasing fiscal constraints demand increased cooperation to create synergy, reduce duplication of effort and ensure interoperability."[48]

This effort could begin with joint training among existing allies with more advanced military space experience and gradually building outward to include those allies with still-developing capabilities. During this time, the more advanced militaries could begin to establish an information network to support operational cooperation and eventually feed into a proposed allied space organization. As the assets of this body are developed, operational control could gradually be transferred from national to allied mechanisms, thus providing greatly enhanced peacetime deterrence and, when necessary, increased effectiveness in the use of conventional forces on the ground, at sea, and in the air. Over time these institutions and practices could transform the business of space security from a national into an allied enterprise, spreading risk, reducing individual costs, and increasing reliability. Part of the future-leaning agenda of such an organization might be to explore possible contacts with countries like India, Russia and, eventually, even China, in order to make restraint-based conflict prevention mechanisms for space truly international.

As noted above, the United States is in a uniquely advantageous situation compared to China in having highly capable space partners who are also military allies. As China space expert Gregory Kulacki argues, "China is concerned about the general

[48] Joint Air Power Competence Centre, "NATO Space Operations Assessment," p. 49.

effort of the US during the Bush administration to form a Japanese-Indian alliance to contain China," including in space.[49] But Washington needs to be careful not to overplay its hand. Building a collaborative alliance in space to reduce vulnerability could be seen as destabilizing by outside parties. Specifically, building an offensive-oriented space alliance, as noted by Morgan, is likely to threaten China and lead to hostile reactions and possibly a space arms race. For this reason, the United States and its allies need to be careful about their rhetoric and, when possible, inclusive in terms of confidence-building measures with other countries, portraying the alliance as *defensively* oriented and non-threatening to other countries. Paths to cooperation with other parties through confidence-building measures, participatory space situational awareness, and community "policing" of space to identify bad behavior (such as jamming or laser interference) should also be encouraged. New rules and even treaties might be considered later based on the non-interference norms and newly established collective security practices developed by the alliance.

In this context, collaborative efforts in allied space security may be a good first step toward reducing space vulnerabilities and helping the world avoid action-reaction arming for space and its harmful effects. But this active cooperation in space security, even among existing U.S. allies, will take time, money, technical resources, as well as political commitments from national leaders, given existing national security barriers. Yet the negative implications of alternative paths that are foreseeable for space make these challenges worth addressing head on. If this process is to succeed, moreover, it

[49] Kulacki quoted in Peter J. Brown, "China fears India-Japan space alliance," *Asia Times*, November 12, 2008.

should begin soon, before new risks to U.S. and allied space security—and further offensive testing by potential adversaries—emerge as alternative space norms.